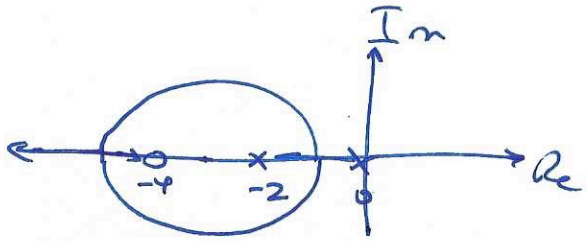
11 1. $K > 6$

2. 2

12 1. $K \geq 2$

2.



1 asymptote at 180°

breakaway pt: $-4+2\sqrt{2}$

break in pt: $-4-2\sqrt{2}$

13 1(A) $\dfrac{Y(s)}{F(s)} = \dfrac{k/Mm}{s^4 + \dfrac{(M+m)k}{Mm} s^2}$

1(B) $\dfrac{V_o(s)}{V_i(s)} = \dfrac{s - 1/RC}{s + 1/RC}$

2. bottom left plot.

3. $e_{ss} = \dfrac{1}{1+2k}$

14 1. (a)

2. (c)

3. asymptotically stable, $z = 0$.

4. a) $G_m \simeq 2$

b) unstable.

15 1. $y(t) = \left(-e^{-2t} + e^{-t}\right) \cdot \underline{1}(t)$

2. (b)

3. $G_R(s) = \dfrac{s + 1/2}{s^2 + 4s + 5/2}$, $G_N(s) = \dfrac{-(s + 1/2)}{s^2 + 4s + 5/2}$

16 1. $\Phi_M \simeq 45°$, $G_M \simeq 12$ dB

$\omega_{\Phi M} \simeq 4 \times 10^6$ rad/s, $\omega_{GM} \simeq 9 \times 10^6$ rad/s

2. a) Yes, stable.

b) unstable.